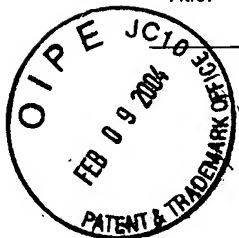


## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Varughese Mathew *et al.* Group Art Unit: 1762  
 Application No.: 10/650,002 Examiner: Unassigned  
 Date Filed: August 27, 2003  
 Title: SEMICONDUCTOR PROCESS AND COMPOSITION FOR FORMING A BARRIER  
 MATERIAL OVERLYING COPPER



## CERTIFICATE OF MAILING

I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO:  
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Date of Deposit

*Patricia Parks*

Patricia Parks

## INFORMATION DISCLOSURE STATEMENT (IDS)

Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, VA 22313-1450

SIR:

In accordance with 37 C.F.R. §1.56 and in compliance with 37 C.F.R. §§1.97 and 1.98, the references listed on attached Form PTO/SB/08 and/or subsequently identified herein, are being submitted herewith for consideration by the United States Patent and Trademark Office. The Office has waived the requirement under 37 CFR 1.98 (a)(2)(i) for submitting a copy of each cited U.S. patent and each U.S. patent application publication for all U.S. national patent applications filed after June 30, 2003 and for all international applications that have entered the national stage under 35 USC § 371 after June 30, 2003. See 37 CFR 1.491(b).

I. COPIES

- a. ☒ A legible copy of (i) each foreign patent(s); (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed, is included herewith.
- b. ☐ Any patents, publications or other information which are listed on PTO/SB/08 which are not enclosed herewith were previously cited by or submitted to the PTO in one of the following applications which has been relied upon for an earlier filing date under 35 U.S.C. §120:

U.S. Serial Number

U.S. Filing Date

II. CONCISE EXPLANATION OF THE RELEVANCE (check at least one box)

- a. ☒ Except as may be indicated below in (b) of this section, all of the patents, publications or other information are in the English language (concise explanation not required).
- b. ☐ A concise explanation of the relevance of all patents, publications or other information listed that is not in the English language is as follows:
- c. ☐ The following additional information is provided for the Examiner's consideration:

III. ☐ CROSS REFERENCE TO RELATED APPLICATION(S)

The Examiner is advised that the following co-pending application(s) contain(s) subject matter that may be related to the present application. By bringing this (these) applications to the Examiner's attention, Applicant(s) does(do) not waive the confidentiality provisions of 35 U.S.C. §122.

Serial No.

Filing Date

Art Unit

**FEES**

- IV. ☒ **THIS IDS IS BEING FILED UNDER 37 C.F.R. §1.97(b):** (check one box)
- a. ☐ within three months of the filing date of a national application other than a continued prosecution application under § 1.53(d) (37 C.F.R. §1.97(b)(1)). No fee or statement is required.
  - b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. §1.97(b)(2)). No fee or statement is required.
  - c. ☒ before the mailing date of a first Office Action on the merits (37 C.F.R. §1.97(b)(3)). No fee or statement is required.
  - d. ☐ before the mailing date of a first Office Action after the filing of a request for continued examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.
- V. ☐ **THIS IDS IS BEING FILED UNDER 37 C.F.R. §1.97(c):** (check one box)  
before the mailing date of any of a Final Office Action under 37 C.F.R. §1.113, a Notice of Allowance under 37 C.F.R. §1.311, or an action that otherwise closes prosecution in the application (See 37 C.F.R. §1.97(c)).
- a. ☐ No statement; therefore, charge Deposit Account **502117** the fee set forth in 37 C.F.R. §1.17(p).
  - b. ☐ See the statement below. No fee is required.
- VI. ☐ **THIS IDS IS BEING FILED UNDER 37 C.F.R. §1.97(d):**  
on or before payment of the issue fee and is accompanied by the following:
- 1) a statement under 37 C.F.R. §1.97(e) as provided below; and
  - 2) charge Deposit Account **502117** the petition fee set forth in §1.17(p).
- VII. ☐ **STATEMENT UNDER 37 C.F.R. §1.97(e)** (check only one box, if applicable)  
The undersigned hereby states that
- a. ☐ each item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of IDS; or
  - b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and to knowledge of the person signing the statement after making reasonable inquiry, no item of information contained in the IDS was known to any individual designated in 37 C.F.R. 1.56(c) more than three months prior to the filing of this statement, or
  - c. ☐ some of the items of information contained in the IDS were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application or, to the knowledge of the person signing the statement after making reasonable inquiry, no item of information contained in the IDS was known to any individual designated in 37 C.F.R. 1.56(c) more than three months prior to the filing of this statement.
- VIII. **PAYMENT OF FEES**
- ☐ A check in the amount of \_\_\_\_\_ is enclosed for the above-identified fee(s).
  - ☐ Please charge Deposit Account No. **502117** in the amount of \$180.00 for the above-indicated fee(s).
  - ☒ If Applicant has overlooked any additional fees, or if any overpayment has been made, the Commissioner is hereby authorized to credit or debit Deposit Account **502117**.
  - ☒ Two Copies of this paper are attached for Deposit Account charges and debits.

The above references are being cited only in the interests of candor and without any admission that they constitute statutory prior art or contain matter which anticipates the invention or which would render the same obvious, either singly or in a combination, to a person of ordinary skill in the art.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule (with a petition if necessary) and charge the appropriate fee to Deposit Account No. **502117**.

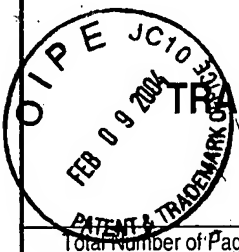
Respectfully submitted,  
Varughese Mathew *et al.*



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Attorney for Applicant(s)  
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Tel. 512.996.6839

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Customer Number 23125

Enclosures: ☒ PTO/SB/08  
☒ References  
☐ Foreign Search Report  
☐ Other:

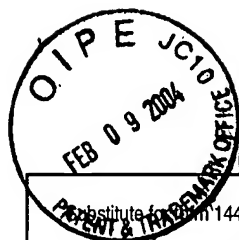


<b>TRANSMITTAL FORM</b>	Application Number	10/650,002
	Filing Date	August 27, 2003
	First Named Inventor	Varughese Mathew et al.
	Group Art Unit	1762
	Examiner Name	Unassigned
Total Number of Pages in this Submission	Attorney Docket Number	SC12804TP

ENCLOSURES		(check all that apply)
<input type="checkbox"/> Fee Transmittal Form	<input type="checkbox"/> Assignment Papers (for an Application)	<input type="checkbox"/> After Allowance
<input type="checkbox"/> Fee Attached	<input type="checkbox"/> Drawing(s)	<input type="checkbox"/> Communication to Group
<input type="checkbox"/> Amendment/Reply	<input type="checkbox"/> Licensing-Related papers	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition	<input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> Affidavits/Declaration(s)	<input type="checkbox"/> Petition to Convert to a Provisional Application	<input type="checkbox"/> Proprietary Information
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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
Firm or Individual	Michael P. Noonan	Registration No.	42,038
Signature			
Date	February 5, 2004		

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Typed or printed name	Patricia Parks	Date	February 5, 2004
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SC12804TP

PTO/SB/08A (04-03)

Institute for Patent & Trademark 1449A/PTO		<b>Complete if Known</b>			
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (use as many sheets as necessary)		Application Number	10/650,002		
		Filing Date	August 27, 2003		
		First Named Inventor	Varughese Mathew et al.		
		Group Art Unit	1762		
		Examiner Name	Unassigned		
Sheet		of		Attorney Docket Number	SC12804TP

U. S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. <sup>1</sup>	Document Number Number -Kind Code <sup>2</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	BA	6,528,409 B1	03/04/2003	Lopatin <i>et al.</i>	
	BB	2003/0111729 A1	06/19/2003	Leu <i>et al.</i>	

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No. <sup>1</sup>	Foreign Patent Document Country Code <sup>3</sup> Number <sup>4</sup> Kind Code <sup>2</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T <sup>6</sup>

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>2</sup>
	BC	Duch <i>et al.</i> , "Development and Characterization of Co-Ni Alloys for Microsystems Applications," <i>Journal of the Electrochemical Society</i> , 2002, 149(4), pp. C201-C208.	
	BD	Homma <i>et al.</i> , "Microstructural Study of Electroless-Plated CoNiP Ternary Alloy Films for Perpendicular Magnetic Recording Media," <i>IEEE Transactions on Magnetics</i> , November 1991, 27(6), pp. 4909-4911.	
	BE	Kohn <i>et al.</i> , "Characterization of Electroless Deposited Co(W,P) Thin Films for Encapsulation of Copper Metallization," <i>Materials Science and Engineering</i> , 2001, A302, pp. 18-25.	
	BF	Kohn <i>et al.</i> , "Evaluation of Electroless Deposited Co(W,P) Thin Films as Diffusion Barriers for Copper Metallization," <i>Microelectronic Engineering</i> , 2001, 55, pp. 297-303.	
	BG	Petrov <i>et al.</i> , "Electrochemical Study of the Electroless Deposition of Co(P) and Co (W,P) Alloys," <i>Journal of the Electrochemical Society</i> , 2002, 149(4), C187-C194.	
	BH	Osaka <i>et al.</i> , "Fabrication of Electroless NiReP Barrier Layer on SiO <sub>2</sub> without Sputtered Seed Layer," <i>Electrochemical and Solid-State Letters</i> , 2002, 5(1), pp. C7-C10.	
	BI	O'Sullivan <i>et al.</i> , "Electrolessly Deposited Diffusion Barriers for Microelectronics," <i>IBM Journal of Research and Development</i> , September 1998, Vol. 42, No. 5, pp. 607-620.	
	BJ	Segawa <i>et al.</i> , "Manufacturing-ready Selectivity of CoWP Capping on Damascene Copper Interconnects," <i>Advanced Metallization Conference 2001, AMC 2001 Proceedings of the Conference</i> , pp. 567-572.	
	BK	Shacham-Diamand <i>et al.</i> , "Electroless Co(W,P) and Co (Mo,P) Deposition for Cu Metallization Applications," <i>IEEE, 2001 6th International Conference on Solid State and Integrated Circuit Technology</i> , Vol. 1, 2001, pp. 410-415.	
	BL	Shacham-Diamand <i>et al.</i> , "Electroless Deposition of Thin-Film Cobalt-Tungsten-Phosphorus Layers Using Tungsten Phosphoric Acid (H <sub>3</sub> [P(W <sub>3</sub> O <sub>10</sub> ) <sub>4</sub> ]) for ULSI and MEMS Application," <i>Journal of the Electrochemical Society</i> , 2001, 148(3), pp. C162-C167.	
	BM	Shacham-Diamand <i>et al.</i> , "Material Properties of Electroless 100-200 nm Thick CoWP Films," <i>Electrochemical Technology Applications in Electronics Proceedings of the Third International Symposium Electrochemical Society Proceedings</i> , 2000, Vol. 99-34, pp. 102-110.	

Examiner Signature		Date Considered	
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EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation, if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> Unique citation designation number. <sup>2</sup> See Kinds of U.S. Patent Documents. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Applicant is to place a check mark here if English Language Translation is attached.

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